

## PATENT ABSTRACTS OF JAPAN

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(21)Application number : 11-211842

(71)Applicant : NIDEC COPAL CORP

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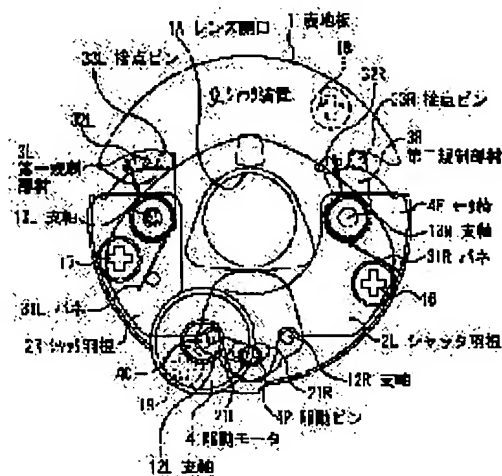
(72)Inventor : YAGINUMA DAISUKE

## (54) CAMERA SHUTTER DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To simplify a mechanism for stopping shutter blades halfway, controlling the blades and set a diaphragm as for a camera shutter device whose shutter blades are used also as a diaphragm.

SOLUTION: The camera shutter device is provided with the shutter blades 2L and 2R, control members 3L and 3R, a driving motor 4 and a control part. The shutter blades 2L and 2R are arranged so as to be moved in an opening/closing direction relative to a lens aperture 1A, and the blades are started up from an initial position so as to open/close the lens aperture 1A to perform the exposure operation. The shutter blades 2L and 2R are controlled by the control members 3L and 3R with a prescribed energizing force so that the blades 2L and 2R may be stopped with a prescribed aperture diameter in the case of diaphragming with a prescribed aperture diameter with reference to the lens aperture 1A. In the case of executing the exposure operation by moving the shutter blades 2L and 2R from the initial position to the stop position, diaphragming and thereafter moving the blades into the closing direction, the driving motor 4 is controlled by the control part so that a driving force necessary to start up the blades from the initial position but smaller than the energizing force of the control members 3L and 3R may be generated to hold the shutter blades 2L and 2R at the stop position in contact with the control members 3L and 3R.



## LEGAL STATUS

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## CLAIMS

## [Claim(s)]

[Claim 1] Shutter equipment for cameras characterized by providing the following. The shutter wing which is arranged possible [ movement in the open direction and the closed direction ] to lens opening, starts from an initial valve position, opens and closes lens opening, and performs exposure operation. Specification-part material which can regulate this shutter wing by the predetermined energization force in the halt position corresponding to this aperture when applying drawing with predetermined aperture to lens opening. The driving source which generates driving force required in order to move this shutter wing. The control section which controls this driving source, is made to generate driving force [ required for starting from an initial valve position and ] weaker than the energization force of specification-part material, and holds this shutter wing in this halt position where this specification-part material is contacted when moving in the back close direction to which moved this shutter wing to the halt position from the initial valve position, and drawing was applied and performing exposure operation.

[Claim 2] Shutter equipment for cameras according to claim 1 which equips alternatively a different halt position corresponding to different aperture with at least two controllable specification-part material for a shutter wing in order to apply drawing with different aperture.

[Claim 3] It is shutter equipment for cameras according to claim 2 which functions by having at least two shutter wings which move in linkage mutually, and one of the two's shutter wing functioning when applying drawing with the first aperture in contact with one of the two's specification-part material when the shutter wing of another side applies drawing with the second aperture in contact with the specification-part material of another side.

[Claim 4] Shutter equipment for cameras according to claim 1 which contains the specification-part material of small assistance of the energization force from this specification-part material, and suppresses the play in contact with the shutter wing of another side while it has at least two shutter wings which move in linkage and one of the two's shutter wing is regulated by the halt position in contact with this specification-part material.

[Claim 5] It is shutter equipment for cameras according to claim 1 which is regulated in this intermediate halt position when starting the aforementioned shutter wing in the closed direction from the initial valve position which opens this lens opening fully and applying drawing, the aforementioned control section controls this driving source, strengthens driving force beyond the energization force, moves this shutter wing in the closed direction further from a halt position, and carries out the close by-pass bulb completely of the lens opening.

[Claim 6] It is shutter equipment for cameras according to claim 1 which regulation can be applied in an intermediate halt position when starting the aforementioned shutter wing in the open direction from the initial valve position which carries out the close by-pass bulb completely of this lens opening and applying drawing, and the aforementioned control section controls this driving source, is made to reverse driving force, moves this shutter wing in the closed direction from a halt position, and carries out the close by-pass bulb completely of the lens opening.

[Translation done.]

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the shutter equipment for cameras which has the shutter wing which served as drawing which specifies the aperture of lens opening.

[0002]

[Description of the Prior Art] When photoing a photographic subject using a still camera conventionally, there is a case where he wants to optimize drawing of a lens and the combination at the time of a shutter second according to a situation. As such a camera, the drawing aperture board which specifies the aperture of lens opening from the former, and the shutter wing which open and close lens opening were prepared separately, and there was a method controlled individually, respectively. Even if it extracted in simple and was the camera whose aperture is 1 or two steps, when drawing precision was required, the composition mentioned above was adopted. Although a drawing number of stages is good at least especially when performing exposure control of cameras using CCD, such as a digital still camera, the rapidity of drawing precision and a shutter wing is demanded. This originates in the latitude of the digital camera which used CCD being narrow.

[0003]

[Problem(s) to be Solved by the Invention] However, an actuator is needed for the drive of a drawing aperture board and a shutter wing, respectively, and there are big restrictions in respect of cost, space efficiency, etc. As a means replaced with this, the structure of making drawing serve a double purpose by the shutter wing is also known. It is the structure which was stopped while having opened the shutter wing and was set up beforehand of extracting and obtaining aperture. In this case, after carrying out a halfway halt of the shutter wing, applying mechanical regulation and canceling regulation mechanical after an appropriate time, you have to close a shutter wing. For this reason, the composition of specification-part material could not but become complicated.

[0004]

[Means for Solving the Problem] The following meanses were provided in order to solve the technical problem of a Prior art mentioned above. That is, the shutter equipment for cameras concerning this invention is equipped with a shutter wing, specification-part material, the driving source, and the control section as fundamental composition. The aforementioned shutter wing is arranged possible [ movement in the open direction and the closed direction ] to lens opening, is started from an initial valve position, opens and closes lens opening, and performs exposure operation. The aforementioned specification-part material can regulate this shutter wing by the predetermined energization force in the halt position corresponding to this aperture, when applying drawing with predetermined aperture to lens opening. The aforementioned driving source generates driving force required in order to move this shutter wing. When moving in the back close direction to which moved this shutter wing to the halt position from the initial valve position, and drawing was applied and performing exposure operation, the aforementioned control section controls this driving source, generates driving force [ required for starting from an initial valve position and ] weaker than the energization force of specification-part material, and where this specification-part material is contacted, it holds this shutter wing in this halt position. In order to apply drawing with different aperture preferably, a different halt position corresponding to different aperture is alternatively equipped with at least two controllable specification-part material for the shutter wing. Moreover, it has at least two shutter wings which move in linkage mutually preferably, one of the two's shutter wing functions, when applying drawing with the first aperture in contact with one of the two's specification-part material, and the shutter wing of another side functions, when applying drawing with the second aperture in contact with the specification-part material of another side. Moreover, while it has at least two shutter wings which move in linkage preferably and one of the two's shutter wing is regulated by the halt position in contact with this specification-part material, the specification-part material of small assistance of the energization force is included from this specification-part material, and the play is suppressed in contact with the shutter wing of another side. With 1 operation gestalt, when starting the aforementioned shutter wing in the closed direction from the initial valve position which opens this lens opening fully and applying drawing, it is regulated in this intermediate halt position, and this driving source is controlled, driving force is strengthened beyond the energization force, and the aforementioned control section moves a shutter wing in the closed direction further from a halt position, and carries out the close by-pass bulb completely of the lens opening. With other operation gestalten, when starting the aforementioned shutter wing in the open direction from the initial valve position which carries out the close by-pass bulb completely of this lens opening and applying drawing, regulation can be applied in an intermediate halt position, and the aforementioned control section controls this driving source, reverses driving force, moves this shutter wing in the closed direction from a halt position, and carries out the close by-pass bulb completely of the lens opening.

[0005] According to this invention, by serving as drawing by the shutter wing, the thing which was the need conventionally and for which it extracts and the motor for an aperture board drive is excluded becomes possible, and it is very effective in respect of cost and a space. In order to set a shutter wing to the halt position which regulates aperture, it realizes by setting up the output of a driving source smaller [ it is larger than the operation torque of a shutter wing, and ] than the energization force of specification-part material,

and strong driving force is impressed to a shutter wing from the energization force of specification-part material from a halt position to a closed position. For example, if the output of a driving source is smaller than the energization force of specification-part material when a shutter wing makes it run in the closed direction from the initial valve position of a full open state, the movement of the closed direction will be regulated by specification-part material, and a shutter wing will be held in the halt position corresponding to predetermined aperture. A shutter wing runs from an intermediate halt position to a closed position after predetermined elapsed time by switching the output of a driving source more greatly than the energization force of specification-part material. It becomes possible to set a shutter wing to the halt position corresponding to desired drawing aperture, and it becomes unnecessary thus, to adopt complicated regulation structure like the former by performing electric control to a driving source by this invention.

[0006]

[Embodiments of the Invention] With reference to a drawing, the form of operation of this invention is explained in detail below. Drawing 1 is the typical plan showing the operation form of the shutter equipment for cameras concerning this invention. In addition, this shutter equipment is built into a digital camera. Shutter equipment 0 is assembled using the front cope plate 1 so that it may illustrate. In addition, the lining cloth board (not shown) is attached in the undersurface of the front cope plate 1 with screws 18 and 19. In order to form lens opening 1A in the center at the front cope plate 1 and also to support each component part, Pivots 12L, 12R, 13L, and 13R etc. are implanted.

[0007] The shutter wings 2L and 2R of a couple, the specification-part material 3L and 3R of a couple, and the drive motor 4 used as a driving source are attached in the front cope plate 1. In addition, in order to control a drive motor 4, the control section containing CPU is incorporated as an electrical part. The shutter wings 2L and 2R of a couple are arranged possible [ movement in the open direction and the closed direction ] to lens opening 1A, are started from an initial valve position, open and close lens opening 1A, and perform exposure operation. Drawing 1 expresses the initial valve position of the shutter wings 2L and 2R of a couple, and is in a full open state with this operation form. In fact, the shutter wings 2L and 2R of a couple are stored in the wing room between the front cope plate 1 and the lining cloth board mentioned above. Focusing on pivot 12L, one shutter wing 2L is a rotatable, and can run from the open position of illustration to a counterclockwise closed position. Shutter wing 2R of another side is similarly carried possible [ rotation ] focusing on pivot 12R, and can run toward a clockwise closed position from the open position of illustration.

[0008] The specification-part material 3L and 3R can regulate the shutter wings 2L and 2R by the predetermined energization force in the halt position corresponding to this aperture, when applying drawing with predetermined aperture to lens opening 1A. With this operation gestalt, in order to apply drawing with different aperture, a different halt position corresponding to different aperture is alternatively equipped with at least two controllable specification-part material 3L and 3R for the shutter wings 2L and 2R.

Specifically, the shutter wings 2L and 2R of a couple move in linkage mutually, one of the two's shutter wing 2L functions, when applying drawing with the first aperture in contact with first specification-part material 3L, and shutter wing 2R of another side functions, when applying drawing with the second aperture in contact with second specification-part material 3R. Specifically, first specification-part material 3L is carried in the front cope plate 1 possible [ rotation ] focusing on pivot 13L. Shutter wing 2L and contact pin 33L which can be contacted are attached at the nose of cam of first specification-part material 3L. Moreover, spring 31L which energizes first specification-part material 3L clockwise is attached in pivot 13L. The nose of cam of spring 31L is engaging with stop section 32L formed at the nose of cam of first specification-part material 3L. Second specification-part material 3R is incorporated possible [ rotation ] focusing on pivot 13R. Contact pin 33R which can contact shutter wing 2R of another side is formed at the nose of cam of second specification-part material 3R. Moreover, spring 31R which energizes second specification-part material 3R counterclockwise is attached in pivot 13R, and the nose of cam is engaging with stop section 32 of second specification-part material 3R R.

[0009] The drive motor 4 carried in the front cope plate 1 generates driving force required in order to move the shutter wings 2L and 2R as a driving source. In this example, a drive motor 4 consists of a MUBINGU magnet equipped with drive pin 4P, and rotates bidirectionally focusing on shaft 4C. Drive pin 4P penetrate the front cope plate 1 on the undersurface from the upper surface, and are engaging with bore 21R formed in bore 21L and shutter wing 2R which were formed in shutter wing 2L. If a drive motor 4 rotates counterclockwise from the state of illustration, drive pin 4P will be interlocked with, one shutter wing 2L will rotate counterclockwise focusing on pivot 12L, and shutter wing 2R of another side will rotate clockwise focusing on pivot 12R. As for this, the shutter wings 2L and 2R of a couple run toward the closed direction. Conversely, if a drive motor 4 rotates clockwise, the shutter wings 2L and 2R of a couple will run in the open direction. In addition, the drive motor 4 is attached in the front cope plate 1 through motor frame 4F. Motor frame 4F are attached in the front cope plate 1 with the screws 16 and 17 of a couple.

[0010] When it moves in the back close direction to which the control section included in this shutter equipment 0 moved the shutter wings 2L and 2R to the halt position from the initial valve position, and drawing was applied and exposure operation is performed, A drive motor 4 is controlled, driving force [ required for starting from an initial valve position and ] weaker than the energization force of the specification-part material 3L and 3R is generated, and the shutter wings 2L and 2R are held in a halt position, where the specification-part material 3L and 3R is contacted. Then, after predetermined time progress, driving force is raised and a closed position is run the shutter wings 2L and 2R. In addition, in the initial valve position, the motor rotator of a drive motor 4 is clockwise attracted with the magnetic substance. By generating the driving force exceeding this suction force, the shutter wings 2L and 2R start.

[0011] Drawing 2 is the \*\* type view showing the cross-section configuration of the shutter equipment 0 shown in drawing 1. This shutter equipment 0 consists of a front cope plate 1 and a lining cloth board 5 so that it may illustrate. The lining cloth board 5 is attached in the front cope plate 1 with screws 18 and 19, as mentioned above, and the wing room is formed among both the cope plates 1 and 5. The shutter wings 2L and 2R of a couple are stored in this wing room. The drive motor 4 is attached in the front cope plate 1 through motor frame 4F. As mentioned above, motor frame 4F are attached in the front cope plate 1 with screws 16 and 17. A drive motor 4 is a MUBINGU magnet type, and can be rotated focusing on shaft 4C. Drive pin 4P which projected from the MUBINGU magnet penetrate the front cope plate 1 on the inferior surface of tongue from the upper surface, and are engaging with the shutter wings 2L and 2R. That is, drive pin 4P of a drive motor 4 have connected with the shutter wings 2L and 2R, and perform these opening-and-closing operations. First specification-part material 3L is a rotatable focusing on pivot 13L implanted in the front cope

plate 1. Contact pin 33L formed at the nose of cam of first specification-part material 3L penetrates the front cope plate 1 on the inferior surface of tongue from the upper surface, and one shutter wing 2L and contact are possible for it. Moreover, spring 31L is being engaged between pivot 13L and stop section 32L, and is energizing first specification-part material 3L. Second specification-part material 3R is incorporated possible [ rotation ] focusing on pivot 13R similarly implanted in the front cope plate 1. Shutter wing 2R of another side and contact are possible for contact pin 33R formed at the nose of cam of second specification-part material 3R. Spring 31R is attached between pivot 13R and stop section 32R, and second specification-part material 3R is energized.

[0012] Drawing 3 is a plan showing the first halt position of the shutter equipment 0 shown in drawing 1. When driving force was impressed to the shutter wings 2L and 2R from the initial valve position shown in drawing 1, as it mentioned above, it runs in the closed direction. Here, if driving force T is smaller than the energization force T1 of first specification-part material 3L, as while showed drawing 3, point 22 of shutter wing 2L L will stop, where first specification-part material 3L is contacted. At this time, lens opening 1A is partially covered by the shutter wings 2L and 2R of a couple, and forms first small drawing 1AA. Specifically, shutter wing 2L rotates counterclockwise focusing on pivot 12L, and after the point 22L has contacted contact pin 33 of first specification-part material 3L L, it stops. Naturally shutter wing 2R of another side interlocked with stopped shutter wing 2L will also be stopped. If driving force of a drive motor 4 is strengthened from the state which set small drawing 1AA, the shutter wings 2L and 2R will run in the closed direction further, and will perform predetermined exposure operation.

[0013] In addition, in the first halt position of illustration, to one shutter wing 2L being positioned in contact with first specification-part material 3L, it has stopped in the free state, and shutter wing 2R of another side is considered, when position-precision does not come out, since there is play. In order to prevent this, prepare the specification-part material of small assistance of the energization force, shutter wing 2R is made to contact, and you may make it absorb the play from first specification-part material 3L. For example, when it extracts like this operation form in two steps, and aperture is not regulated but it considers as one step of drawing regulation, second specification-part material 3R becomes unnecessary. Then, it can use for the specification-part material of the assistance which adjusted and mentioned above the position and energization force of this second specification-part material 3R.

[0014] Drawing 4 is the typical plan showing the second halt position of the shutter equipment for cameras shown in drawing 1. the energization force T1 of first specification-part material 3 from initial valve position L shown in drawing 1 -- large -- the [ and ] -- a total of T of the energization force T1 of 1 specification-part material 3L, and the energization force T2 of second specification-part material 3R, if the driving force T smaller than  $T1+T2$  is impressed to the shutter wings 2L and 2R of a couple After passing through the first halt position shown in drawing 3, it is stopped in the second halt position shown in this view, and these shutter wings form second small drawing 1AAA. The great portion of lens opening 1A is covered by the shutter wings 2L and 2R, and small effective opening is formed in the center so that it may illustrate. Since it is larger than the energization force T1 of first specification-part material 3L, even if nose-of-cam 22 of shutter wing 2L L contacts contact pin 33L of the first specification-part material, it does not stop, but driving torque T outputted from a drive motor 4 runs in the closed direction further. Although shutter wing 2R of another side also runs in the closed direction according to this, it stops, when the point 22R contacts contact pin 33 of second specification-part material 3R R. Since it is smaller than the sum total of the energization force T1 of first specification-part material 3L, and the energization force T2 of second specification-part material 3R, the driving force T outputted from a drive motor 4 cannot overcome the energization force of second specification-part material 3R, and the shutter wings 2L and 2R cannot run in the closed direction further.

[0015] Drawing 5 is the typical plan showing the closed position of the shutter equipment for these cameras. The shutter wings 2L and 2R of a couple have covered lens opening 1A completely, and express with this closed position the state where exposure operation was completed. From the second halt position shown in the first halt position or drawing 4 shown in drawing 3, if the driving force of a drive motor 4 is switched up, the shutter wings 2L and 2R of a couple will specification-part [ first ] material 3L Reach, will overcome the energization force of second specification-part material 3R, and will reach a closed position. One shutter wing 2L is in the state which the point 22L set to contact pin 33 of first specification-part material 3L L per whenever, and rotates specification-part material 3L to a counterclockwise rotation limit. Similarly, shutter wing 2R of another side is in the state to which the point 22R contacted contact pin 33 of second specification-part material 3R R, and rotates second specification-part material 3R to a clockwise rotation limit.

[0016] Drawing 6 is a typical timing chart which shows exposure operation of the shutter equipment for these cameras. (A) expresses typically exposure operation which goes to the closed position shown in drawing 5 from the open position (initial valve position) shown in drawing 1. That is, it is the case where exposure operation is performed, without applying drawing in any way. the charge start of CCD built in the digital camera at this time -- the time check at the time of an exposure second -- starting -- a time check -- a motorised wave is started to the closed direction energization with completion This amount of energization is set up so that the driving force T outputted from a motor may become larger than the sum total of the energization force T1 of the first specification-part material, and the energization force T2 of the second specification-part material. With mechanism delay predetermined by impressing large driving force to a shutter wing, the high-speed run of the shutter wing is carried out from an open position at a closed position, and one exposure operation ends it. Then, a motorised wave is switched to the open direction energization, and a shutter wing is returned to the initial valve position of full open from a closed position.

[0017] (B) expresses the case where exposure operation is performed from the first halt position (small drawing 1) of drawing 3. The driving force T first smaller than T1 is impressed to a shutter wing, and it moves to the first halt position (small drawing 1) shown in drawing 3 from the early open position. The time check at the time of an exposure second is started in this state, and driving torque T is made larger than the sum total of T1 and T2 simultaneously with completion. Thereby, a shutter wing runs from the state of the small drawing 1 to a closed position, and performs one exposure operation. If (B) is compared with (A), the total light exposure shown by hatching has (less B) compared with (A) so that clearly.

[0018] (C) expresses the case where exposure operation is performed from the second halt position shown in drawing 4. The motorised force T is first set up between T1 and  $T1+T2$ , a shutter wing is moved to the second halt position of drawing 4 from an open position, and the small drawing 2 is set. When the time check at the time of an exposure second is started simultaneously [ with the

character of CCD ] after this and it completes, the motorised force T is made larger than the sum total of T1 and T2. Thereby, a shutter wing runs toward a closed position from the state of the small drawing 2, and exposure operation completes it. The total light exposure shown by hatching becomes still smaller than the total light exposure of (B).

[0019] As mentioned above, in the example shown in drawing 6 , a shutter wing is regulated in an intermediate halt position, when starting in the closed direction from the initial valve position which opens lens opening fully and applying drawing. A control section controls a drive motor, strengthens driving force beyond the energization force, moves a shutter wing in the closed direction further from a halt position, and carries out the close by-pass bulb completely of the lens opening. On the other hand, in the example shown in drawing 7 , when starting a shutter wing in the open direction from the initial valve position which carries out the close by-pass bulb completely of the lens opening and applying drawing, regulation can be applied in an intermediate halt position, and a control section controls a driving source, reverses driving force, moves a shutter wing in the closed direction from a halt position, and carries out the close by-pass bulb completely of the lens opening. If it explains concretely, in (A), the motorised force will be greatly set up in the open direction, and a shutter wing will be moved to an open position from an early closed position. A closed position is run a shutter wing from an open position, and one exposure operation is finished with starting a time check in this state and reversing the driving force after predetermined-time progress in the closed direction from open. In (B), the driving force of a degree is moved to the state of the small drawing 1 from an early closed position by being impressed by the shutter wing in the middle. The time check at the time of an exposure second is started simultaneously with CCD ON here, the driving force of a motor is reversed in the closed direction from open with completion, a closed position is run a shutter wing from the state of the small drawing 1, and one exposure operation is completed. Furthermore, in (C), a shutter wing is set to the state of the small drawing 2 from a closed position by impressing comparatively small driving force. And the time check at the time of a shutter second is started simultaneously with ON of CCD, the motorised force is reversed in the closed direction with completion, a closed position is run a shutter wing from the state of the small drawing 2, and one exposure operation is completed.

[0020]

[Effect of the Invention] As explained above, according to this invention, the thing which was the need conventionally and for which it extracts and the drive motor for aperture boards is excluded becomes possible by making drawing serve a double purpose by the shutter wing, and it is very effective in respect of cost and a space. Moreover, since the set to an aperture regulation position can realize driving force by controlling electrically, it is compared with the former and can simplify the structure of specification-part material.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the plan showing the operation gestalt of the shutter equipment for cameras concerning this invention.

[Drawing 2] It is the typical cross section showing the structure of the shutter equipment for cameras concerning this invention.

[Drawing 3] It is the plan with which explanation of the shutter equipment for cameras concerning this invention of operation is presented.

[Drawing 4] It is the plan with which explanation of the shutter equipment for cameras concerning this invention of operation is presented.

[Drawing 5] It is the plan with which explanation of the shutter equipment for cameras concerning this invention of operation is presented.

[Drawing 6] It is the timing chart with which explanation of the shutter equipment for cameras concerning this invention of operation is presented.

[Drawing 7] It is the timing chart with which explanation of the shutter equipment for cameras concerning this invention of other operation gestalten of operation is presented.

[Description of Notations]

0 [ ... A shutter wing, 2R / ... A shutter wing, 3L / ... The first specification-part material, 3R / ... The second specification-part material, 4 / ... Drive motor ] ... Shutter equipment, 1 ... A \*\* cope plate, 2L

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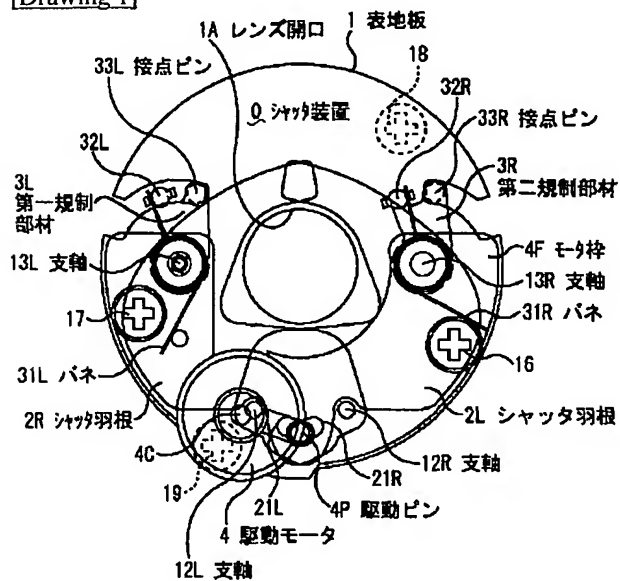
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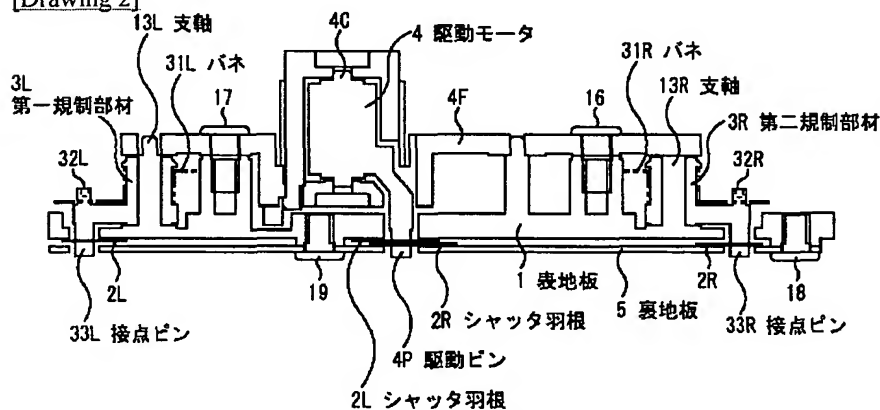
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## DRAWINGS

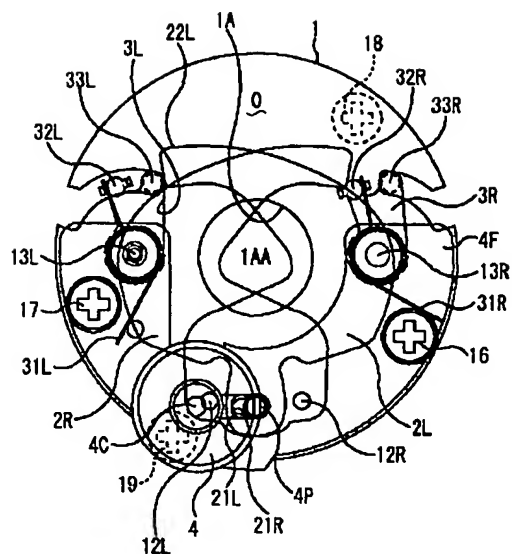
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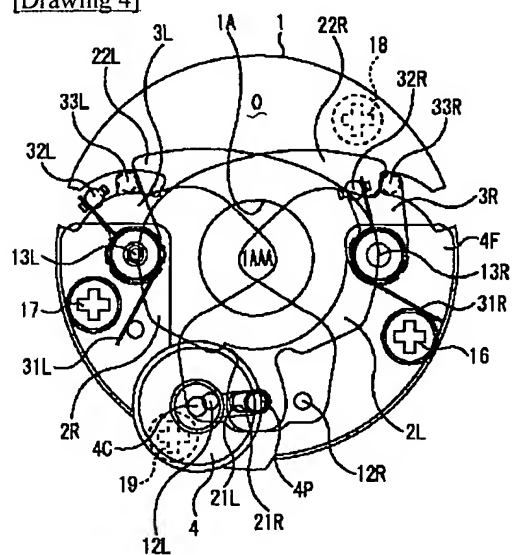
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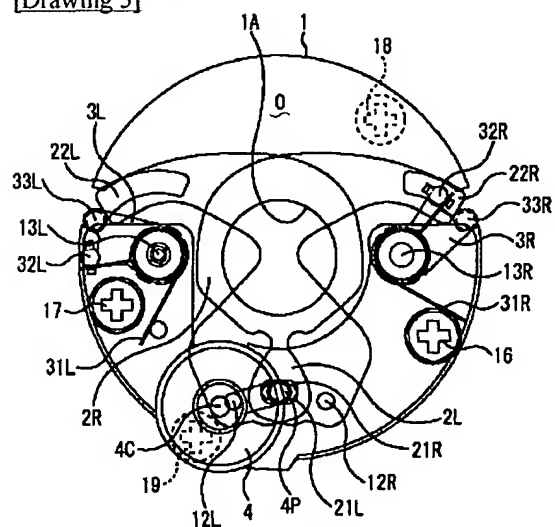
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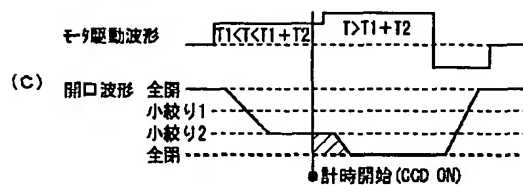
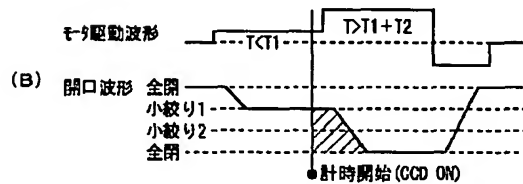
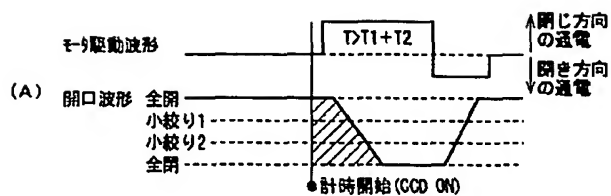
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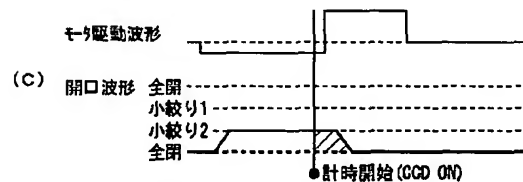
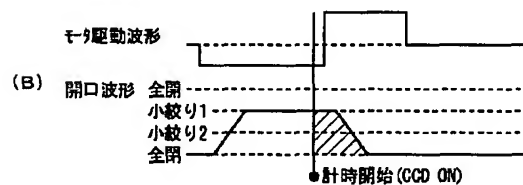
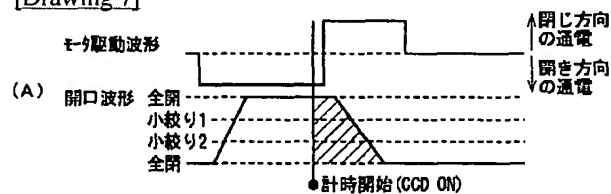
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]